Stockholms Universitet, Statistik

Exam in: **Economic statistics**

Examiner: Mikael Möller

Approved aids: Pen, pencil, calculator, dictionary (also electronic)

Examination day: 111216

Examination time: 5 hours

All assumptions and notations should be explained and defined (also those that have been used during the course). All answers, reasoning and explanations should be easy to follow. Answers and arguments which cannot be understood give 0 points. If you give two answers to one question and one of these answers is wrong, or partially wrong, then this answer is the one to be corrected.

Phones must be turned off!

Good luck!

1: National accounts (20p)

One company returned the following answers to a questionaire from SCB:

Items	**SEK**
Sales of clothes, purchased for resale	40 345 000
Sale of manufactured clothes	25 020 000
Inventories of clothes for resale in the beginning of the period	5 900 000
Inventories of clothes for resale at the end of the period	6 200 000
Purchases of clothes for resale	48 225 000
Cost of raw material	7 040 000
Energy costs	7 500 000
Cost of machinery	2 095 000
Employee	65
Total salary per employees per year = 300 000 SEK	

a. Calculate production, intermediate consumption and value added.

b. Do you see any potential problems in the numbers? Explain!

c. Obviosly one figure must be wrong and a recontact gave that the true value should be 28 225 000 SEK. Which value is wrong? Explain your choice.

d. Recalculate production, intermediate consumption and value added. Is it a profitable company?

Exam in: Economic statistics (forts)

2: Index (20p)

a. Name three major uses or aims of a price index.

b. Describe very briefly in words how you can compute a volume index from a value index and a price index.

c. The table below shows annual means of the consumer price index (CPI) and a salary index in some fictitious country. Compute (for 1990, 1995, 2000, 2005, 2010) a new index series (with base year 1990=100) of salaries in **real** terms; that is, an index series of salaries with consumer price changes eliminated.

Year	CPI	Salary index
1990	100.00	100.00
1995	162.13	159.83
2000	179.49	188.57
2005	187.22	203.55
2010	215.63	248.11

d. In which one of the following three ways shall a CPI computation (which follows the HICP rules) treat prices that are reduced by a sales discount?

The sales reduced prices are the same for all customers without any conditions.

Are these prices to be

(1) taken before the sales reduction, or

(2) taken after the sales reduction, or

(3) taken as if they were missing and thus be excluded from the index computation?

e. Same question as d), but for a producer price index (PPI).

3: Index (20p)

a. Give **one (not more)** example of problems in producing a fixed basket index.

b. Name **two (not more)** examples of types of statistical errors in a CPI.

c. Which is usually largest of a Laspeyres index and a Paasche index, and how are the levels of these two indices usually related to the level of a cost of living index?

d. Explain very briefly why a Laspeyres index and a Paasche index differ from each other in the way they usually do.

e. What is a superlative index, and how is it related to a cost of living index?

Exam in: Economic statistics (forts)

4: SAMU (20p)

a. What is meant by permanent random numbers (PRN) in a frame or register.

b. Suppose that you have a frame consisting of ten enterprises with 250, 1125, 350, 400, 75, 70, 125, 1350, 1230, 525 persons employed, respectively. One wants to draw a sample of size 4 with πps. Describe how this can be done.

(The PRN of the 10 enterprises are in the same order: 0.1372, 0.8749, 0.0209, 0.7553, 0.4681, 0.4472, 0.8922, 0.6562, 0.4172, 0.4342)

c. What is negative coordination of two samples and why can that be a good objective? Describe how the PRN can be used to draw a new sample with negative coordination.

d. When you make a panel study with rotating panels, the oldest panels will be drawn from older, now obsolete, frames. That is; they will not contain recently entered units (e.g. immigrants or newly started businesses). Describe how this problem can be solved by permanent random numbers.

5: Time series (20p)

a. The moving average and decomposition methods are not good for forecasting. Why?

b. A very simple method that gives forecasts is simple exponential smoothing. Derive this forecast and give a forecast for time $n + m$ given all values up to time n.

c. A more sophisticated forecast may be given by the ARIMA-model. Give a general formula for this model and explain what its components stands for.

d. Descibe the workflow in an ARIMA analysis. Which are the main tools in this analysis?